



B.E - EEE - END SEMESTER EXAMINATION - APRIL/MAY 2019 (FULL TIME)  
COLLEGE OF ENGINEERING, ANNA UNIVERSITY CHENNAI - 25

EE8602 POWER SYSTEM OPERATION AND CONTROL (R 2012)

MAX TIME: 3Hrs

MAX MARKS: 100

ANSWER ALL QUESTIONS

PART A (10\*2=20)

1. What are the different types of load on a power system?
2. Name any two reactive power sources and sinks.
3. What is Spinning Reserve?
4. Define Control Area.
5. Give any two important functions of the Energy Management system?
6. Give the formula for finding the participation factor of any unit in an N unit system for a small change in the system load.
7. What is the main purpose of exciter?
8. Define power system security?
9. Differentiate Plant Level and System level control.
10. Define Voltage collapse phenomenon.

PART B (5\*16=80)

11. a) i. Explain the fundamentals of speed governing system with a linkage diagram for a single area system and perform static analysis for uncontrolled case. (10)  
ii. What are the different types of excitation systems depending on the type of exciter? (6)

12 a) Explain any two voltage control methodologies? (OR)

12 b) State the key principles followed behind the Voltage and reactive power planning and assessment with regard to a power system? (6)

13 a) i. Differentiate Hot and Cold reserve. (6)

ii. A generating station has the following daily load cycle.

Time (Hrs)	0-6	6-10	10-12	12-16	16-20	20-24
Load (MW)	40	50	60	50	70	40

Draw the load curve. Calculate the Maximum demand, Units generated, Average load and load factor. (10)

(OR)

13 b) i. What is the need for Frequency and Voltage regulation (10)

ii. What are the main functions in security control? (6)



14 a)i. Find the economic dispatch schedule as requested in each part. Use the method and starting conditions given.

Input output characteristics (Rs/hr)	Minimum (MW)	Maximum (MW)
$F_1 = 0.0035 P_1^2 + 6.49P_1 + 750$	100	400
$F_2 = 0.0081P_2^2 + 5.75P_2 + 870$	100	380
$F_3 = 0.001P_3^2 + 8.56P_3 + 620$	50	160

Total demand of 800 MW. Use participation factor method to calculate the dispatch for a load is increase to 880 MW. (10)

ii. What are the various constraints imposed on an Unit Commitment problem? (6)

(OR)

14 b) i. Derive the coordination equation for an Economic dispatch problem with loss. (6)

ii. Four units to be committed to serve a load of 540 MW. Find the optimum unit commitment using forward dynamic programming method. Fuel cost of each unit is 1.1 Rs/MBtu. No units were "ON" during the start of the period. (10)

UNIT	Max (MW)	Min (Mw)	Inc. heat rate(Btu/K wh)	No load cost Rs/h	Start Up cost Rs	Inc Cost Rs/Mw h
1	80	25	10440	213	350	20.88
2	250	60	9000	585.62	400	18
3	300	75	8730	684.74	-	17.46
4	60	20	11900	252	0	23.8

15 a) Explain in detail the various hardware components of the Master Terminal Unit and the Remote Terminal Unit with a neat block diagram?

(OR)

15 b) What are the different operating states of a power system. With a neat figure explain the various control strategies adopted to restore the system back to normal?

